

# **TESSELLATE:**

***Integrating Multicultural Stories Through Architectural Design***

**An Honors Thesis (HONR 499)**

**by**

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## **Abstract:**

This thesis presents multiculturalism as a global societal value and narrates how the architectural design of a living-learning community integrates multicultural groups together within the eclectic, urban context of downtown Vancouver. The project, *Tessellate*, incorporates a multi-faceted structure and skin system that unifies its community but can be adapted through hierarchical scales to meet the complex needs of a mixed-use program. A focus is given to how multicultural groups can learn from one another; a narrative of how individuals are shaped by personal experiences is used to depict how these individuals can interact with one another and their designed environment.

# Acknowledgements

There are many people I would like to thank who have helped me with this thesis project.

First, I would like to thank my thesis advisor, Professor Robert J. Koester, who also served as my studio instructor during the design stage of this project. Koester provided relevant architectural precedents related to my design and helped me refine my ideas. He also helped expand what I thought I could achieve at my grade level, encouraging our studio to submit our projects to the national ACSA steel competition.

Secondly, I would like to express my gratitude to those that made the competition project possible. I want to thank MKM Architecture + Design for sponsoring Ball State's third-year competition. I would also like to thank the numerous faculty and student reviewers that gave me feedback on my process and encouraged me to push my design farther.

Additionally, this thesis project would not be possible without the travel experiences I have gained. I would like to thank CAP for providing me with study-abroad opportunities to a total of nine countries outside of the United States through its travel programs to Canada, Europe, and South America. I would like to thank the friends I have made through travel, especially Parinitha, who was my first friend from another racial group. Also, I would like to thank my parents, for encouraging me and helping support my travels abroad, as only one of a few in my extended family to travel outside of North America

Finally, I would like to thank Ball State University's Honors College. Our classes, especially HONR 189, with Dr. Laurie Lindberg, have challenged us to think critically about cultural challenges around the globe. Honors classes also have fostered discussion, helping me learn from my peers, which was the model I employed as my design project.

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# Process Analysis Statement

I framed much of *Tessellate*'s design intent statement based on first-hand inspirations from traveling and studying abroad. Many times, I could hear echoes of my own stories in the research I was completing. For example, when I read that two of the best ways to combat racial tension are to travel and to make friends from other racial groups (Markus and Conner 2015, 84), I thought about my experiences during CAPItalia. In the summer of 2015, I traveled with a group of 10 architecture students from Ball State University in a four-week study, exploring architecture and urban planning in the countries of Italy, France, Spain, Switzerland, and Germany.

Admittedly, before traveling, my scope of world experience was limited. I only had simplified concepts of other cultures to compare to my Midwest background. Of the cities we studied, Barcelona was the most memorable. There, I was immersed in architecture, art, and the Catalan language. Like most cities, there were places to eat, to live, to worship, and to play, but in Barcelona, these places were integrated with a rich cultural identity I cannot fully describe. The geometric designs, the vivid colors, and the Mediterranean atmosphere all helped create a sense of place. If one characteristic of the

vibrant city had been removed, the experience would not have been as genuine or memorable.

Also, on that trip, I discovered how studying abroad can generate conversations about one's life journey. Parinitha, a graduate student on the trip, became my first friend from another racial background; she is originally from India. Honestly, I had initial reservations in talking to her because of our clear differences. However, throughout the trip, our group found and ate at an Indian restaurant in nearly every country we visited. During these meals, we all shared stories about food, families, and hometowns. Since meeting Pari, I have found friendships with individuals from other racial and ethnic groups to be some of the most insightful, honest, and energetic friendships I have made.

I have never felt as engaged throughout my academics as I did by working on *Tessellate*. I would imagine students from around the world initiating conversations with others in the learning center's main corridor, peering out to Vancouver's cityscape, and enjoying lunch at one of many multi-cultural food trucks. I would then brainstorm spatial arrangements that could best accommodate these actions.



One of my favorite parts of the design process was modeling a single living unit. Each main unit, designed for two groups of four students, was equipped with sleeping spaces, social spaces, and a faceted façade that related to its interior program. I then discovered how each unit could be aggregated together and how a similar geometric language and steel structure could be adapted to unify the various needs of a mixed-use living-learning community. I greatly enjoyed the project, and I realized how my design for this project was carried out as a story-telling process.

April 2016, I was especially honored to receive 2<sup>nd</sup> place as an individual in the Ball State University Third-Year Competition. I asked Professor Robert J. Koester to be my advisor for this honors thesis project, left campus for the summer, and started my summer job. Then, four months later in August 2016, much to my amazement, I was notified of receiving 3<sup>rd</sup> place in the American Collegiate Schools of Architecture national competition. I was honored to receive such high recognition for all my hard work and grateful for the input to my project along the way.

The juror's comment for the design included, *"This successful design put thought into how people actually inhabit the space*

*along with how the exterior transfers to the inside. Impressive understanding and use of steel in both the interior and exterior."* I was ecstatic that such esteemed jury members<sup>1</sup> had begun to see a story narrated through my design. My project communicated how people would move through spaces and interact with others.

Looking back, I believe my project was a successful architectural design because I was able to carry an empathy for people into my work. I realized how the needs and values of people could be reflected through the tectonic form of a steel structure. This design method and focus will certainly help inform how I approach design projects in the future.

Finally, I realize a lot of my research to develop my thesis beyond the design stage has not been architectural. Analyzing multiculturalism has led me into unfamiliar territories that merge social sciences with political stances. Nevertheless, I believe my investigations have made me a more thoughtful designer as I tried to understand these new perspectives. Overall, I now feel more empowered to place empathy at the forefront of my design process.

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<sup>1</sup> Judges include Antony Wood, Executive Director of the Council on Tall Buildings and Urban Habitat; Jon Magnusson, Chairman of the Board of Magnusson Klemencic; and Gail Borthwick, of Gensler.

# Design Intent Statement

*This statement was part of the competition entry and serves as the platform for the content that follows.*

Vancouver's Cultural and Linguistic Living-Learning Community brings cultural groups together in interdependence to celebrate Vancouver's diversity. The city houses one of the most ethnically and racially diverse populations in Canada. While English and French are Vancouver's official languages, 45% percent of the population grew up speaking other languages. The living-learning community challenges the separation of different social groups with the concept of a tessellation. In a tessellation, each independent part, brought together in an artful composition, makes the whole more complete. Similarly, people tend to learn more from others unlike them than those similar to them.

Vancouver's Cultural and Linguistic Living-Learning Community can accommodate approximately 500 students from across the globe, with an expected 80%

of students coming outside of Canada. Students can immerse themselves in programs of languages, art, and culinary arts, all which focus on a collaborative education process. The living-learning community gives emerging professionals a broadened perspective of the diverse cultures Vancouver is founded upon while promoting opportunities for teamwork and friendship.

Additionally, the public is encouraged to engage in the community personally through the site's design. A central atrium opens the ground level for public interaction with an art gallery to showcase student work. Outside the atrium, an open plaza, covered seating, and park area enable food truck vendors and artisans to gather, promoting visitors and residents to further explore the art of different cultural groups.



# Global Network:

## An Introduction to Multicultural Values

*Culture is powerful precisely because it is usually invisible to the untrained eye. We are born into culturally saturated worlds, and seldom do we see or discuss how other worlds are arranged. Only when we travel to new places or, say, read a book about cultural psychology do we begin to understand how much culture shapes ourselves and appreciate how many different forms cultures can take.*

--Markus and Conner

*Clash!: how to thrive in a multicultural world*

When people travel into a new country or territory, they bring stories with them. They bring their past, their languages, and deep values that have shaped their identity for years. These travelers may or may not be eager to forget their past or hometown and assimilate into a new culture. Nevertheless, they shape the culture of their new land as their new land changes their lives as well.

Today, cultures are coming into proximity more than ever before. This is especially true in urban areas, where individuals of different race, mother tongues, and religion are colliding in education, workplace, and other civic environments. According to the United Nations, the United States and Canada are in the top five countries of the world to receive

immigrants (Welsh 2015). Within these countries, areas of multiculturalism present strengths, challenges, and long-term opportunities.

One of the most visible benefits of multiculturalism is the diverse range of public activity it can provide. Immigrants can introduce new recipes at restaurants. They may influence a neighborhood's character through new cultural art markets. Many immigrants are also eager to celebrate traditional holidays. Around the world, for example, many communities celebrate Chinese New Year; a city's streets can be overwhelmed with coiling dragons and the ceremony's honored color of red. A city will evolve with its population, often adopting many characteristics of immigrant groups.

Secondly, multiculturalism can help individuals see the world in a larger global context. The collective journeys taken by individuals around the planet remind us of a life outside our individual frames of reference. Multigenerational groups may realize their visible surroundings and everyday interactions have changed with time and are predicted to continue changing. First-generational groups may be uncomfortable integrating into the culture of a long-established society.



Ideally, this initial discomfort can prompt individuals to reflect deeper upon their own culture, combatting a phenomenon known as cultural “blindness,” or the lack of realizing that one has a culture (Markus and Conner 2016, xxii). For example, many North Americans of European descent have grown up thinking they were simply “regular” people. According to a 2012 survey of representative Americans, 50 percent of Whites “never think about race” (Markus and Conner 2015, 65). Majority groups of European descent, especially those of multiple generations, have often felt little need to understand culture as a situational factor of behavior.

As different cultural groups move into proximity, questions must be raised about what makes individuals different, and what makes them similar. An awareness of race, ethnicity, and discrimination have been shown to keep these questions and further conversations flowing. People who understand that culture is a powerful force also score lower on measures of both explicit and implicit prejudice (Markus and Conner 2015, 85). Ultimately, promoting multiculturalism can lead people away from discrimination in their decision-making processes.

Finally, and perhaps most powerfully, multiculturalism encourages long-term opportunities for achieving societal complexity. Cultural groupings are each “saturated” with information, experiences, and ideologies that make some ways of thinking easier than others. Markus and Connor discuss that “self-

complexity is your superpower,” but this can be realized at the larger urban scale as well as personal (Markus and Conner 2015, 214). Each cultural group can introduce new perspectives, understandings, and thought processes to a larger society; when more of these tools are made available, a wider variety of circumstances can be resolved. As a planet, the better we can understand, navigate between, and encourage connections among cultural groups, the better we can react to adversity.

Today's societies are discovering that the most prevalent challenges they are facing are intricately complex. Global climate change, food insecurity, water scarcity, epidemics, and financial crises are anything but localized events. They cannot be fully resolved at a local level because both their causes and effects extend globally. Additionally, the global movement of people through travel, trade, and digital networking also has escalated local challenges into a much more complex network around the planet. Those ties that led us to develop and later understand global issues can also help us respond to them. Only with the best sense of hopefulness, can one say that the achievement of such a global effort will generate a planet more gratifying than before.

Areas that promote multiculturalism in North America have proven to be hubs for innovative ideas. In the United States, California has been known for decades to have the highest immigration rates, receiving many cultural groups from around the world. Also, in the US,



three of the top eight biotech centers are in California, even though the industry is historically rooted in the Northeast; similarly, three of the top five patent-applying regions are in Californian cities. (Markus and Conner 2015, 118) The Bay Area region known as the Silicon Valley is also the home to many start up and global technology companies, including Apple, Facebook, and Google.

Since these areas have consistently been some of the most diverse areas in the world, perhaps the “bumping, churning, and recombining of ideas from all directions” has led to these scientific and technological breakthroughs (Markus and Conner 2015, 118) Other North Americans are optimistic for the long-term opportunities that multiculturalism can provide. Here, though, this enthusiasm must be embraced with a cautionary note. The ties of multiculturalism that historically led to intellectual and income benefits for a few sub-sections of society can and should be used to address the consequential global liabilities, namely including climate change, worker exploitation, and resource depletion.

Whether or not multiculturalism is embraced, cultures are colliding now more than ever. Humans are moving around the globe both physically, through travel, and digitally, through shared media. Individuals have more accessibility to extend their social network to a global context and understand their perspective of the planet.

Finally, it is important to emphasize that multiculturalism is an intricately complex topic. Multiculturalism can lead to high levels of discomfort and create risky environments of social tension. Individuals often find comfort in their own culture, relying on a single localized group for familiar expertise. They may discourage outsiders from sharing languages, experiences, or information if they believe in the absolute virtue of their own culture. However, this is not in humanity's best interests. According to Markus and Conner, “Rather than accepting the melting pot idea that immigrants should give up their first selves and assimilate to their new home, embracing all one's identities was the surest path to health and well-being.” How well humanity can link our cultural divisions in a globalized planet will not only determine our cultural richness but also our ability to react to adversity in the future.



# Vancouver, BC:

## The Eclectic North American City

Vancouver, BC, accommodates one of the most racially and linguistically diverse populations in North America. The city has become known as the most “Asian” city outside of Asia, with nearly half of its citizens having Asian heritage. Similarly, nearly half of its citizens grew up speaking a language other than English (Todd, 2016). In comparison with other top cities, Metro Toronto comprises 35%, and San Francisco 33 % of Asian population (Todd 2016). These demographics, illustrated in *Figures 1-6* may explain the city’s existing cultural challenges, especially deficits of understanding between groups. However, many social scientists and other residents of Vancouver are optimistic about the city’s growing cultural diversity. By fostering opportunities for inter-group interaction and adapting institutions to overcome cultural barriers, further long-term benefits of multiculturalism can be realized.

Metro Vancouver’s Asian population consists largely of three main groups: Chinese, Indians, and Filipinos (Todd 2016). There are also many smaller Asian groups; some include those from South Korea, Pakistan, Iran, Vietnam, Singapore, Afghanistan, and Lebanon (Todd 2016).

Additionally, Vancouver’s population is anything but fixed. Illustrated in *Figure 1*, the city’s population has doubled in the past 30

years. According to *Statistics Canada*, Metro Vancouver is the third fastest growing-city in Canada, behind only Toronto and Montreal (Todd 2016). Per *Figure 1* and *Figure 4*, this growing population is largely attributable to immigrants; nine out of ten newcomers to Metro Vancouver between 2001 and 2011 were born outside of the country, and over 70% of these recent immigrants have origins in Asia (Todd 2016). Assuming this trend will continue, the Asian population of Vancouver is projected to continue increasing. Vancouver should anticipate opportunities for multicultural richness, as well as tension between groups.

According to cultural analysts, a rise in Asian-oriented attractions, schools, religious structures, community service organizations, and events can be expected. One of the most notable examples of an existing Asian attraction is the Dr. Sun Yat-Sen Classical Chinese Garden. This was the first garden in the Ming Dynasty-style created outside of China, and was, in fact, rated by National Geographic in 2011 as the world’s top city garden (Luba, 2011). Receiving over 100,000 visitors annually, the Chinese Garden is one of the city’s many cultural charms.

Unfortunately, though, the city’s diverse racial and ethnic composition has led to negative consequences; many seem to be attributed to a deficiency of understanding

Figure 1: Metro Vancouver- Population

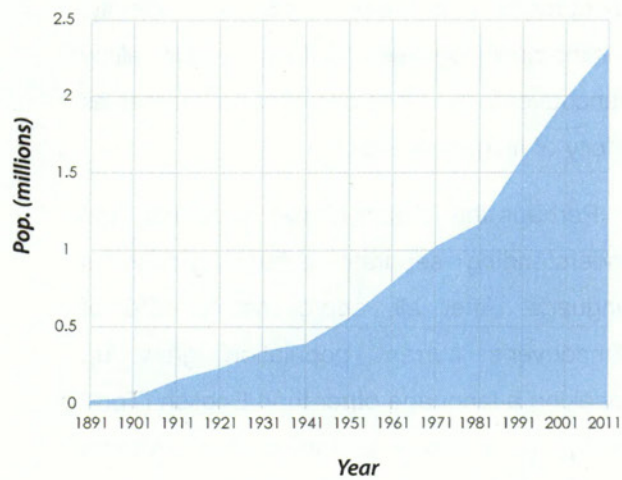


Figure 2: Metro Vancouver - Annual Immigration

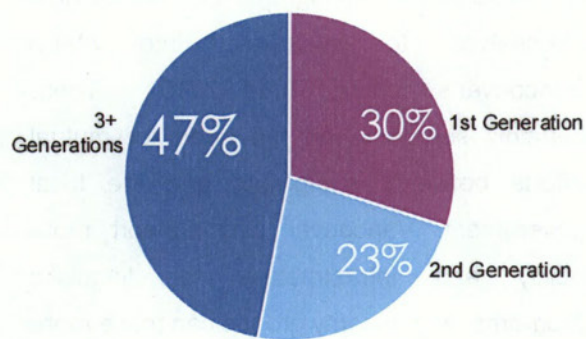
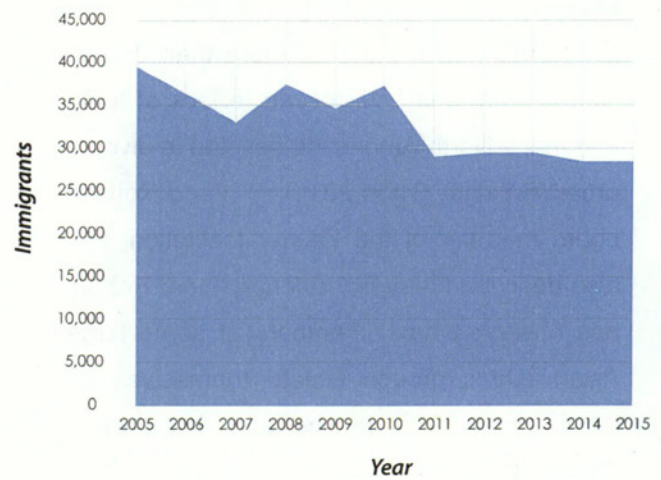


Figure 3: BC Province - Generations in Canada

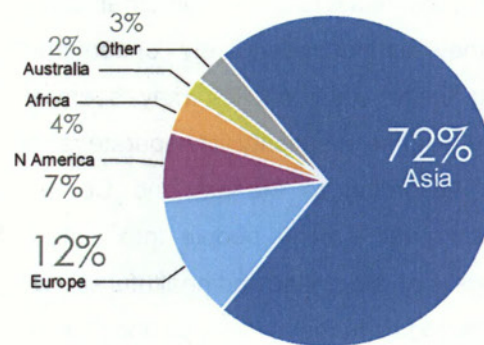


Figure 4: BC Province - Immigrant Groups

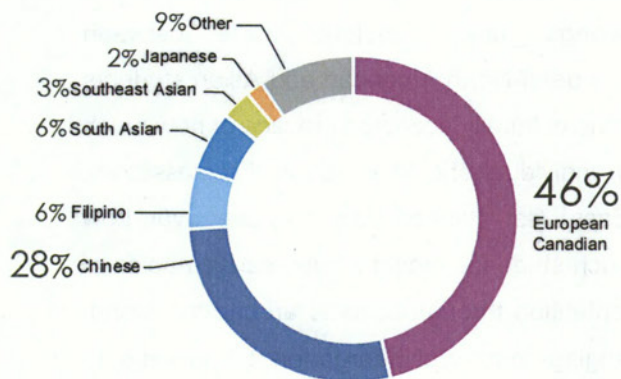


Figure 5: Vancouver - Current Racial Composition

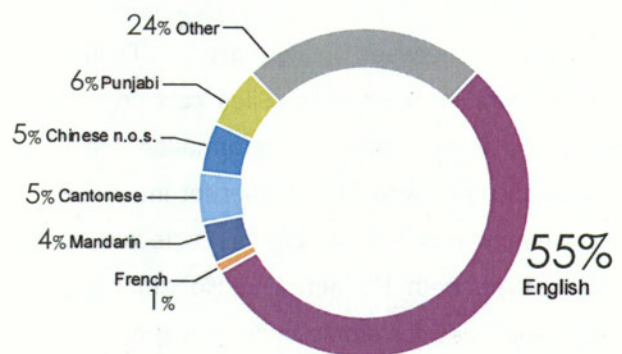


Figure 6: Vancouver - First Language



between groups. Sociologist Robert Putnam has conducted a study of more than 30,000 North Americans and noticed "a lack of trust" that many North Americans develop in diverse urban settings. (Todd 2011). Farid Rohani, board member of the Laurier Institution, has also described a similar phenomenon. Rohani has observed how "members of some large Asian ethnic groups isolate themselves by forming cultural, language and moral silos" (Todd 2016).

Individuals do tend to be comfortable around those they can relate to and uncomfortable with those they cannot adequately understand. Creating these isolated silos may seem to generate a sense of security for separate racial groups. According to Markus and Conner, recognizing and sorting people into cultural groupings is an automatic and healthful skill we have adapted as humans (Markus and Conner 2015, pg). If we help those most associated to us, we may be helped in return; therefore, these silos can provide an intermediate sense of safety.

Collectively, though, these silos reinforce barriers between groups, limiting multiculturalism's benefits. Silos can prevent groups from sharing information and experiences or working together for the larger community gain. In a city as eclectic as Vancouver, both Putnam and Rohani agree upon the need for ethnic and racial groups to "integrate and not keep separate" (Todd 2011 and Todd 2016). To achieve this effectively, a transparency of understanding needs to be

encouraged between groups. Ideally, collaboration between cultures would allow Vancouver to live up to one of its nicknames as a "city of neighborhoods."

Perhaps the largest barrier to trusting and understanding separate cultural groups is language. After all, approximately 45% of Vancouver's current population grew up speaking a language other than English (Todd 2016). To respond to this barrier, Putnam stresses that the government must help immigrants improve their English; Rohani emphasizes that immigrants are responsible themselves to assimilate into Metro Vancouver's culture (Todd 2016). There certainly seems to be the need for mutual efforts between immigrants and the local government. Vancouver can support more policy and infrastructure for linguistic programs, and minority groups can make more effort to step outside of their cultural silos to learn official languages.

Other barriers outside of language can divide cultural groups as well. In classroom settings, one prevalent divide between European-North American and Asian students is the culturally accepted practice of how much an individual should speak in the classroom. "East-West clashes, like the one over how much students should speak, cause ripples of contention through schools around the world, ranging from prekindergarten classrooms to postdoctoral lecture halls" (Markus and Conner 2015, 2). From childhood, many Westerners value independence; they are taught to speak



up, to make personal choices, to show excitement, and to individuate from others. On the other hand, many Eastern cultures value interdependence, they are taught to be quiet while learning, to be content with previously-established decisions, to stay calm, and to fit in (Markus and Conner 2015, 2) These may be oversimplified representations of broad cultural groupings, but these values reveal a clash of learning styles. A Western teacher, for example, may discriminate against an Asian student who is quiet during discussions, simply because the student has been taught that, "He who knows does not speak. He who speaks does not know" (Markus and Conner 2015, 3).

In addition to clashing values, Vancouver's rapidly increasing population may heighten mistrust between cultural groups. Edwin Hui, Regent College professor and Vancouver resident for 43 years "believes any cultural tensions that exist in Metro Vancouver because of high Asian immigration 'are the understandable growing pains in the development of a great city'" (Todd 2016).

Vancouver's immigration from Asian countries has been growing and is predicted to grow rapidly. In any city, high immigration rates can place a significant burden on a city's existing infrastructure. Schools, hospitals, homes, and other structures must accommodate the needs and wants of immigrants. This process requires time to plan and construct to enable current residents to acclimate to their changing surroundings. If new immigrants look, speak, and act

differently, citizens are likely to feel uncomfortable about their new neighbors.

Despite these barriers and challenges, social scientists are optimistic about the cultural and behavioral differences that diverse groups bring into a city such as Vancouver. Across sources, understanding dividing lines between groups is a beginning step towards identifying proactive opportunities. "Understanding the meanings and intentions behind these ways of being can not only dispel bad feelings in school and work, but also help us harness the strengths of Eastern and Western selves for the betterment of both groups" (Markus and Conner 2015, 3).

To foster an understanding between cultures, a city's institutions and interactions must be addressed. "Embracing all of one's identities" as was previously mentioned, is essential in a multicultural world. In Vancouver, it may be impossible to know all the laws, policies, or theories at play in diverse cultural groups. Nevertheless, when culture is seen as an active force that shapes an individual's behavior, patterns can be detected.

Evident values, such as the importance of speaking up verses staying quiet, may allow us to anticipate how cultural groupings may interact with one another. According to Markus and Conner, daily interactions are guided by designed products, these include media, stories, and architecture (Markus and Conner 2015, xx) The designed environment is saturated with culturally rich information. These



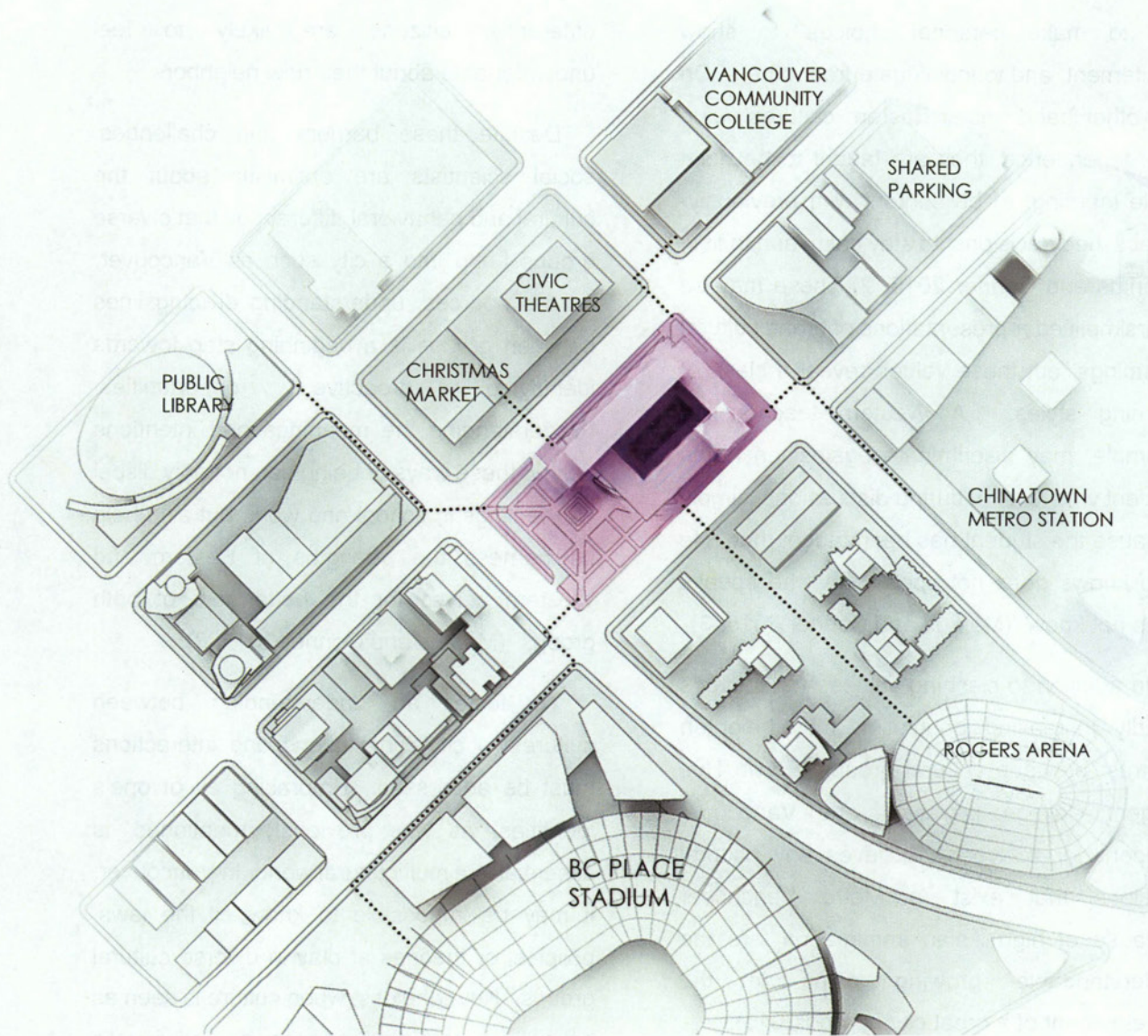


Figure 7: Tessellate Site Plan

products can facilitate the ways people to act, think, and behave. When we can anticipate what individuals need and value, we can design accordingly for positive interaction between groups.

Finally, the ideas and interactions of its citizens will guide Vancouver's growth as the city shapes its citizens. As the entirety of otherwise isolated cultures interact and transform, the culture of Vancouver as a whole will expand and enrich its current cosmopolitan identity.



# The Downtown Site:

## Contextual Factors that Guide *Tessellate*'s Design

*Tessellate* is located on 4060 Dunsmuir Street in Vancouver, BC and is easily accessible by public transportation, automobile, and on foot. The nearby Chinatown, historic Gastown, and the heart of downtown Vancouver are all less than a 10-minute walk away. In fact, the metro station that serves Chinatown is directly northeast of the project's site. Because of its urban context, illustrated in *Figure 7*, *Tessellate* would be visible to many thousands of travelers daily.

A variety of institutional and recreational assets are located within the project's immediate walking range. Students can use the nearby public library as an educational resource. Additionally, the neighboring Queen Elizabeth Theater and Christmas Market can contribute to *Tessellate*'s creative atmosphere, promoting public art.

Seasonal events at the BC Place Stadium and Rogers Area southeast of the project's site also can help bring locals and tourists into *Tessellate*'s ground-level plaza. This open space allows seasonal crowds to gather, providing a venue for community events and an outlet for multicultural food trucks or artisans.

In terms of the site's geographic context, Vancouver is adored for its scenic harbor views. While these views are primarily screened by surrounding buildings,

Vancouver's harbor can be observed from above the 10<sup>th</sup> floor in the northeastern corner of the project's site. *Tessellate*'s identifying tower is located in this corner. The upper stories of *Tessellate* provide 360-degree views of Vancouver and are primarily used for student- social activities.

Additionally, Vancouver has often been referred to as "the City of Glass." Its contemporary aesthetic of steel and glass reveals the city's recent growth; Vancouver has doubled its population in just 30 years (Todd 2016). The city's frequent cloud cover also promotes a transparent façade that is open to daylight and views. *Tessellate* utilizes a similar steel and glass assembly consistent to Vancouver, but a unique façade patterning is introduced to reveal its structure.

Vancouver also has a reputation for wet weather. The city receives approximately 44 inches of rainfall each year, which is approximately 10 inches more than Seattle, Washington (BCPassport, 2016) and (US Climate Data, 2017). Since Vancouver's climate is otherwise mild, covered rooftops and seating areas are utilized in *Tessellate*. Users are protected from rainfall, and the open-air concept enriches one's sense of place in downtown Vancouver.





Figure 8: View from Street Corner

# TESSELLATE

## Introduction

*Tessellate*, Vancouver's Cultural and Linguistic Living-Learning Community brings cultural groups together in interdependence to celebrate Vancouver's diversity. The living-learning community challenges the separation of different groups with the concept of a tessellation. In a tessellation, each independent part is integrated together in an artful composition. A faceted geometric

structure and organizational system unifies *Tessellate's* design, being modified to fit the project's complex program where needed. This is evidenced throughout the residential wings, the residential tower, the learning community, and at the project's ground level. An experiential illustration of *Tessellate's* design is best represented by *Figure 8* above.



Also, similar to the aggregated nature of a tessellation, people tend to learn more from others of difference rather than those of similarity. Vancouver's Cultural and Linguistic Living-Learning Community can accommodate approximately 500 students, with an expected 80% of students coming outside of Canada. Students can immerse themselves in programs of languages, art, and culinary arts, all of which emphasize a collaborative education process. The living-learning community gives emerging professionals a broadened perspective of the diverse cultures Vancouver is founded upon while promoting opportunities for teamwork and friendship.

The mixed-use program of *Tessellate*, shown in Figure 9, incorporates three main elements to provide healthful spaces for a multicultural community to *Live, Learn, and Explore*. Figure 10 on the following page provides a section view of each programmatic element. In all of these spaces, a focus is given to how students can communicate with one another. A narrative example from each programmatic element illustrates how individuals can learn from those of different cultural groups through *Tessellate's* design.

As these stories all occur within one project's site, there was a need to differentiate between programmatic types. Visitors to the ground level bookstore, for example, should not be able to casually stroll into student spaces on upper floors. Programs are primarily organized through stacking

with separate spaces dedicated for vertical circulation to residential and educational levels.

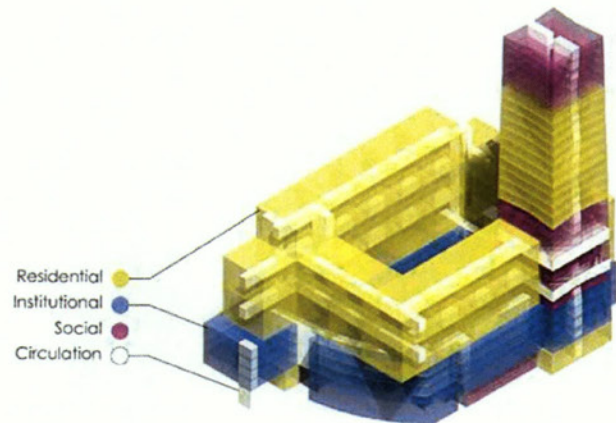


Figure 9: Mixed-Use Programming

Furthermore, the materialization of the building becomes more transparent towards upper levels, with the exception of the ground level. With an increase of height, the surrounding city becomes less compressed, and the site's views are more preferable. The levels of the learning community (L1-4) are clad with a perforated steel system, filtering light into the building's interior while still providing a strong sense of privacy. Residential levels (L5-13) are clad with an alternating system of glass and semitransparent polycarbonate facets to promote a strong but controlled focus toward the surrounding city. The ground level's facade remains largely transparent and open, promoting public interaction. This differentiation of materials throughout levels also helps distinguish *Tessellate's* programs.



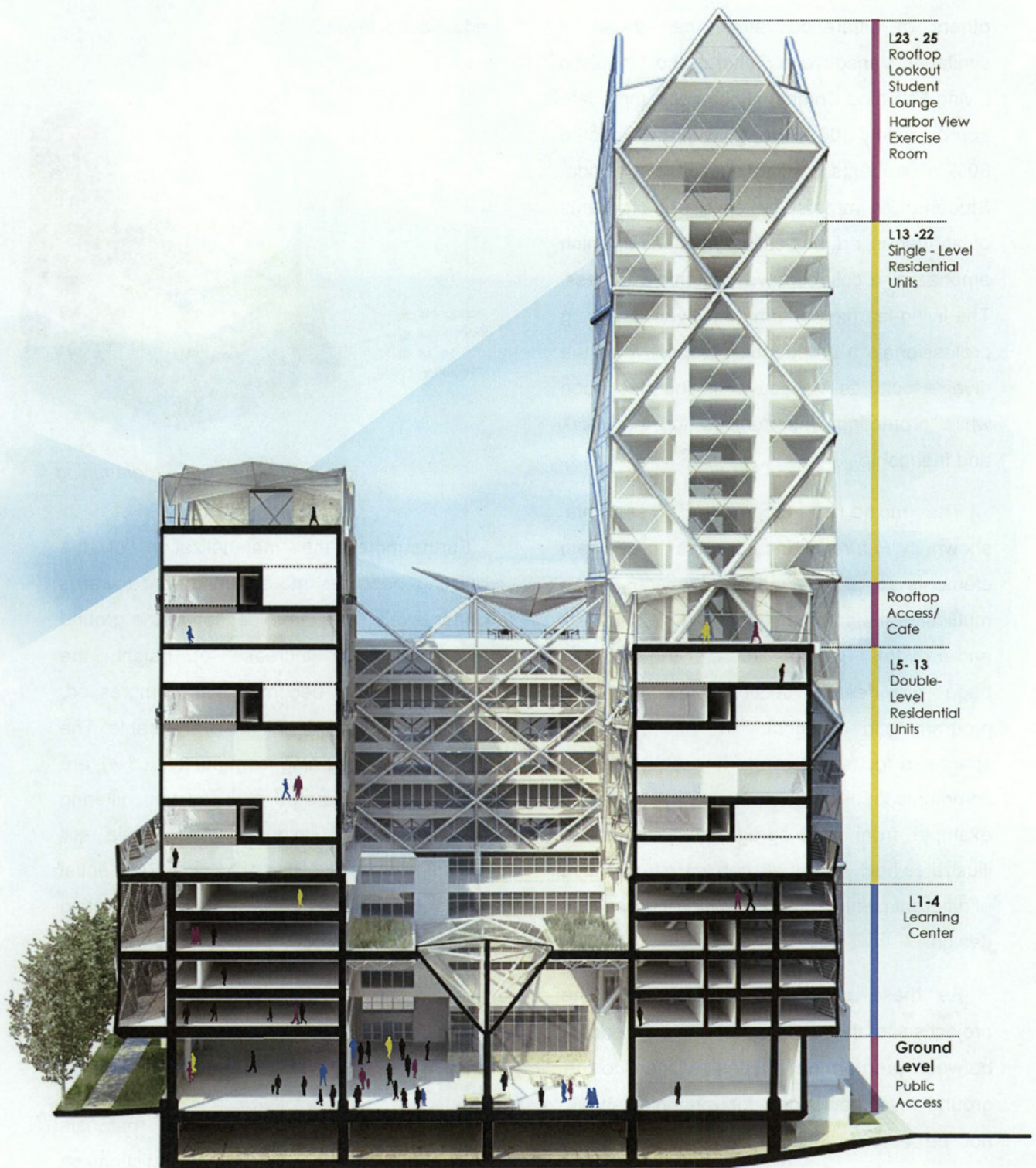


Figure 10: Building Section



**Live**

## **A Story from one Apartment**

*A conversation begins. Kyra, an art student from India talks to her Canadian-born roommate, Catie, explaining that she has never eaten alone before coming to Canada. Kyra recently has learned to cook; in India, Kyra's mother had always prepared meals, which were shared with her large family. Kyra's recipes are, at the moment, experimental.*

*Catie, who is studying culinary arts, is shocked by her roommate's story. Catie grew up in one of Toronto's suburban communities, and her family's schedules rarely aligned enough to share more than a couple of meals per week. In fact, she often attributes her passion for cooking to the independence she maintained throughout grade school; earning the title of "family chef" for the few meals that were shared.*

*Meanwhile, as the smell of experimental curry and rice wafts upstairs into the bedroom floor, Siya, a third roommate, also from India, emerges from studying in her room. She has recognized the familiar spices of the curry dish, but cannot decide if the aroma's differences are attributed to regional differences of their Indian hometowns or to her friend's lack of cooking experience. The two Indian students then discuss the differences and similarities of their respective family's cuisine.*

*Waiting to learn more about the ingredients and preparation techniques, Catie eagerly listens. After several minutes, the fourth roommate, Madison arrives home from her last class, and the four students begin a longer discussion about their favorite recipes, holiday meals, and celebrations.*



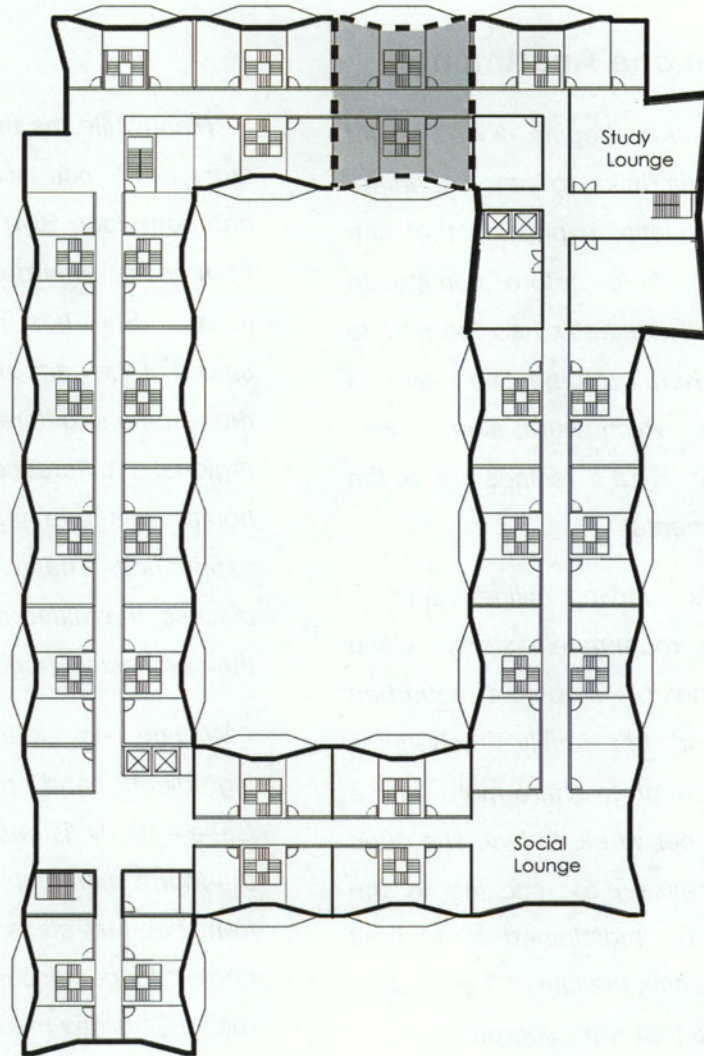
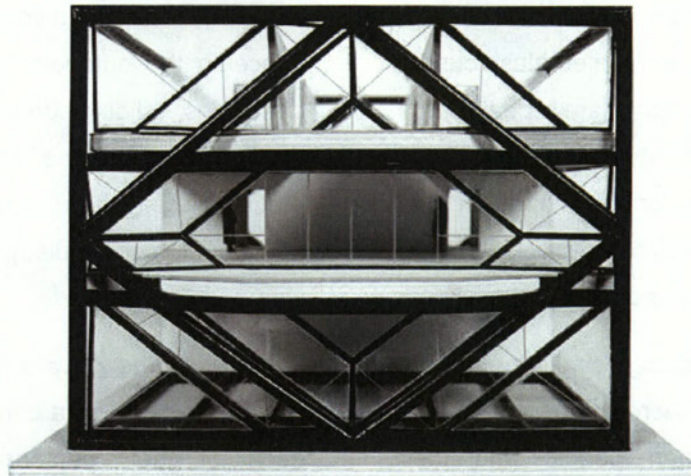


Figure 11: Level 7 Floor Plan



*Figure 12 - 13: Unit Model*



In each of *Tessellate*'s residential units, four students are provided a social sense of both independence and interdependence. Generated from the scale of a single module, shown in *Figures 12-14*, a faceted steel design identifies Vancouver's multicultural living-learning community. The faceted glass curtain wall and floor slab overhangs are repeated with additional residential modules, linking 64 total units and creating an undulating effect that wraps the entire project. The entire plan of level 7, a residential level, is shown in *Figure 11*.

By embracing the design challenge at both a human-scale and macro-scale, interactions are promoted between people and their spaces. By looking at the entire project of *Tessellate*, at 67,000 sq meters, an individual's daily activities and interactions can seem less apparent or even irrelevant. However, by zooming in, to a unit size of roughly 55 square meters of floor area, one can discover that small scales of space are those in which humans interact. In "a group of scales ranging from 1mm to 10m", one can talk to a friend, read a newspaper, or say hello to a passerby (Mehaffy and Salingaros 2015, 79). In closer proximities, stronger synergies can occur.

For students, two vital needs are shelter and community. Generally, apartment units are designed for four students. Each double-level unit is comprised of one private floor, with four bedrooms, and one social floor for students to share.

On the social floor, the central space of each unit comprises of a living room, kitchen, and dining area. Here, engaging discussions, diverse meal preparations, student group meetings, and other social activities can take place. A balcony also expands this social space to the outdoors. In favorable weather conditions, sliding doors can dissolve the barrier between the interior and exterior; students can step outside to continue a conversation or quietly enjoy Vancouver's views.

To reach the private floor, individuals can ascend or descend a central staircase. Within each of their personal sleeping spaces, students can overlook their respective views of the city. This protective space provides a sense of independence within Vancouver's urban density.

Intergroup living arrangements can introduce opportunities for interdependence within the living-learning community. According to psychologist Rudy Mendoza-Denton, "If you looked and looked at all the solutions proposed by scientists over the years to combat prejudice and racism, you'd be hard pressed to find a more effective antidote than intergroup friendship" (Markus and Conner 2013, 84). Friendship-building can be promoted through the ability of individuals to cook, eat, and study together. A clear distinction between private and social spaces between floors can also help each individual maintain his or her own territory if cultural customs clash. Over time, living and socializing with three other students in a



# SCALES OF STUDENT LIVING:

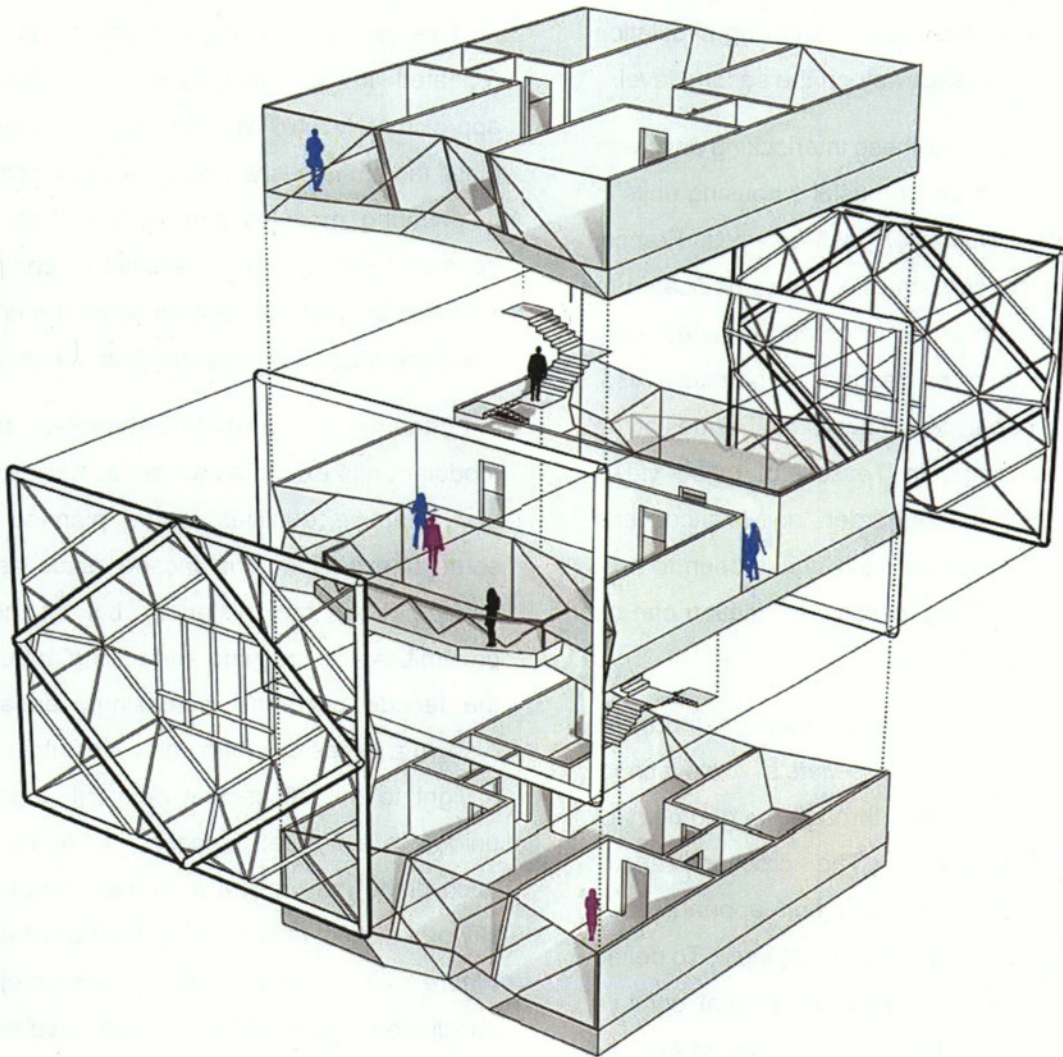
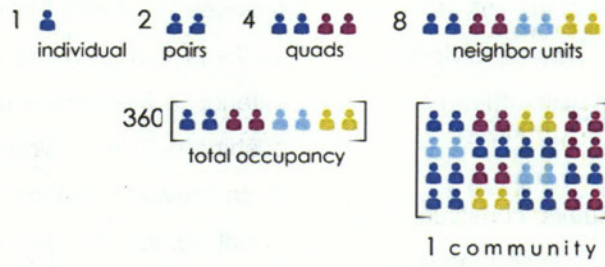


Figure 14: Exploded Axonometric Unit



multicultural housing unit can lead to conversations such as meal preparation techniques, familial upbringing, or travel experiences, which can help individuals understand the context from which their peers grew up.

Two similar apartment units constitute a single living module, which accommodates eight students in total. These two L-shaped units overlap each other, becoming a three-story module in elevation, enabling circulation in a central passageway on the second level.

The concept for these interlocking units was borrowed from Le Corbusier's housing units in his *Unite d'Habitation* in Marseilles, France. With this concept, the floor area dedicated to horizontal circulation is greatly reduced; only one level in three requires a corridor. Also, each unit can access views on both sides of the building's wings; in *Tessellate*, these views include its rooftop garden and Vancouver's cityscape. Because each unit is open to both sides of a building, passive ventilation can be utilized across the space.

Adding to this organizational method, the complexity of *Tessellate*'s elevational organization is visible through the geometry of its faceted façade. The crossed-braced structural frame of each unit appears as a diamond inscribed within a rectangle. To define each unit's social space as a focal point, a similar diamond plane pushes inward from its exterior frame. At each of the diamond's edges, four triangular planes push outward from the

frame, defining each student's personal space. Here, the additional interior space also provides a private overlook through which students can view the city. On the façade's exterior, a final space is created between the pushing-pulling tension of the faceted planes. A cantilevered balcony expands the central social space to the exterior environment. These details are illustrated in the wall section in *Figure 15*.

This pattern for eight students is then repeated in 32 modules to accommodate approximately 240. Within each module, as the glass façade is pushed out on its four corners, neighboring modules can be linked through geometry similarly to a tessellation; complete diamond shapes are created when the corner triangular shapes of adjacent units are aligned.

Furthermore, in a whole composition, these modular units exhibit a new series of aesthetic and adaptive qualities, some planned and some unexpected. The façade reads as flat surface from the distance, but at closer proximities, the "pushing and pulling" nature of the façade becomes increasingly apparent. Also, in a series of lighting analyses, the ability of light to be reflected at different angles is unique to a faceted façade. The direction of each plane may reveal a different hue of the sky or a distinct building reflected from the city. *Figure 20*, towards this thesis project's conclusion, helps capture this reflective effect.

An interesting surprise that guided design refinement was the undulating floor slab

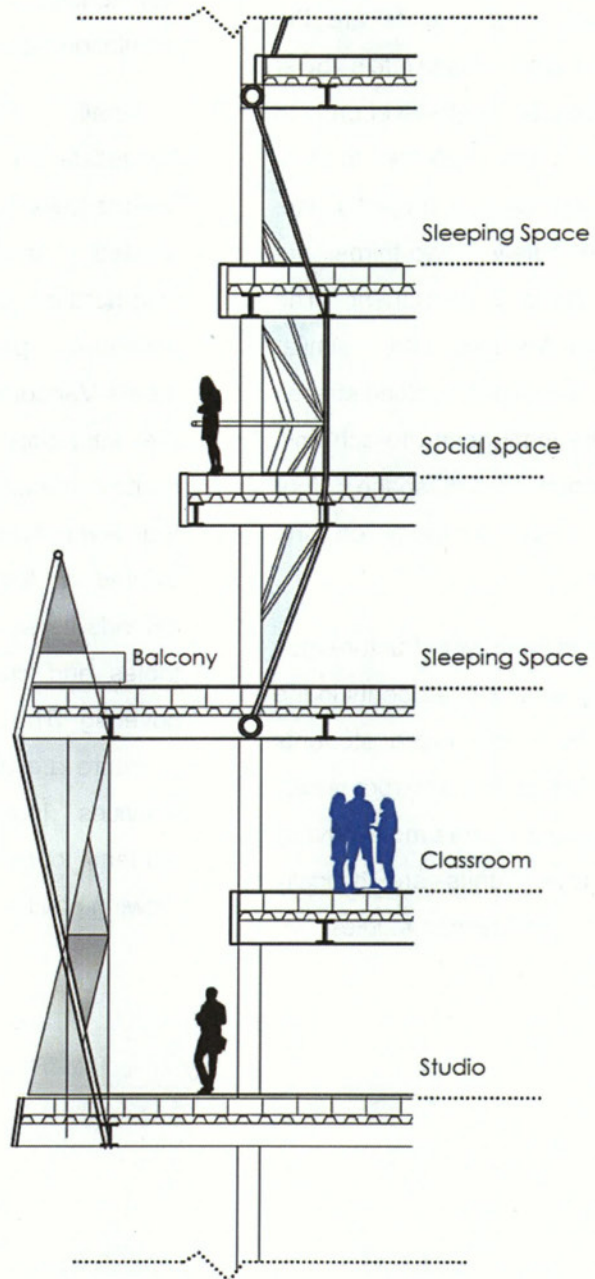


Figure 15: Unit Facade Section



overhangs. These floors appear to flow in and out from the building's structure, providing a smooth rhythm that contrasts with a more rigid patterning system.

While double-level housing units are the primary housing unit type, *Tessellate's* tower structure also provides 20 single-level units to accommodate 80 additional students. In total, 320 students can live on the project's site, which is approximately two-thirds of *Tessellate's* total student enrollment. The single level units are designed with a similar spatial organization; social and cooking spaces are positioned as the focal point of each unit. On the edges of each central space, four students have a personal room on the building's perimeter.

Students that live in the tower structure may not have the balcony access of students in the double-level units; However, these students can enjoy access to Vancouver's harbor views. Because the tower structure has more privacy than other units, tower units are typically reserved for students in advanced studies.

Except for the tower structure, which provides two elevators, students can access their housing units from looping corridors at every three levels. Student lounges and workspaces create enclaves near vertical circulation access points.

Finally, only students who reside in *Tessellate* have access to covered rooftops and the tower structure's top levels. In a similar faceted language, rooftop coverings incorporate folding triangular planes to accentuate points where the tall structure meets Vancouver's skyline. These coverings are supported by extending the structural frame's triangulated tubular steel above the roof level. Additionally, a small student café, located at the tower structure's 11<sup>th</sup> level, extends its seating area by providing outdoor tables and chairs under the protected roof covering. The 23<sup>rd</sup> - 25<sup>th</sup> levels of the tower structure are also reserved for student social activities, including a workout center and student lounge, with access to a rooftop viewing pavilion.





## Learn

### A Story from the Design Studios

*As Sarah walks through the learning community's hallways, she often greets her peers and the school's faculty, which typically leads to unexpected conversations. One afternoon, on her way to her design studio, she spots her friend Tomas leaving the room. He barely glances up as he marches with determination, but he nods his head and says hello when he notices her.*

*Sarah asks how he is doing, and how his team's project is going. After a deep breath, Tomas admits that he could be better. He accidentally miscalculated the wood sizing for his team's massing model, and their studio's midterm project review is due in two days. Sarah talks a little about her process when Tomas asks, but she does not keep Tomas long from his mission to the supply store.*

*Sarah continues to her studio desk, where her project partner Yukio is already busy with their structural model. As usual, his desk is the most organized in the room, even in the middle of the model-building process. She compliments Yukio on the development so far; the two both believe they have been working in the right direction.*

*Their studio project is the design of a clinic and fitness center located in Coquitlam, a nearby municipality in Metro Vancouver.*

*Situated on a hill, their site has beautiful lakeside views, and they both want the landscape to be their design focus.*

*Yukio continually proves to be effective at spatial layouts. He has organized a reception lobby with two clinical offices on opposite sides. The fitness center is located directly across the reception office and main entrance. Once, Sarah asked Yukio why there were no interior hallways in his schematic layout, and Yukio related a story from his grandparent's traditional home near Tokyo, Japan. His favorite space in the house was a corridor that wrapped around the exterior of their home, the engawa, as it was called in Japanese. This space dissolved the barrier between interior and exterior, connected rooms, and served as a sun and wind buffer. More importantly, to Yukio, the engawa provided the perfect spot to sit down, in the half sun and shade, while enjoying tea with his family.*

*Sarah admires the structural attention that Yukio brings into his designs, but growing up near Seattle, she enjoyed the expressive aesthetic of contemporary art and architecture. Analyzing Yukio's floor plan layout, Sarah works on revising a digital model in which the project's columns are to*





Figure 16: Linguistic Classroom

be split into two members, supporting wooden beams. The overall effect creates a ribbed, fin-like roof that appears to reach out to the lakeside views that are immediately visible upon entering the facility. Sarah and Yukio realize they still have many details to address, but they will be ready for their scheduled review.

The curriculum at *Tessellate* focuses on academic fields that are embedded with cultural information. Programs of language include English, Mandarin Chinese, and French. Programs of art and design include

culinary arts, architectural design, art history, painting, sculpture, and graphic design. Integrating these programs together within one multicultural community encourages individuals to address their own frame of reference and use their perspective as a tool to shape creative processes. For example, culinary art students will be impacted by the meals eaten growing up. Graphic art students may utilize subtle motifs from their hometowns, religions, or families in media representation. Architecture students will approach design of residential buildings with the familiarity of the living spaces in which they were raised.

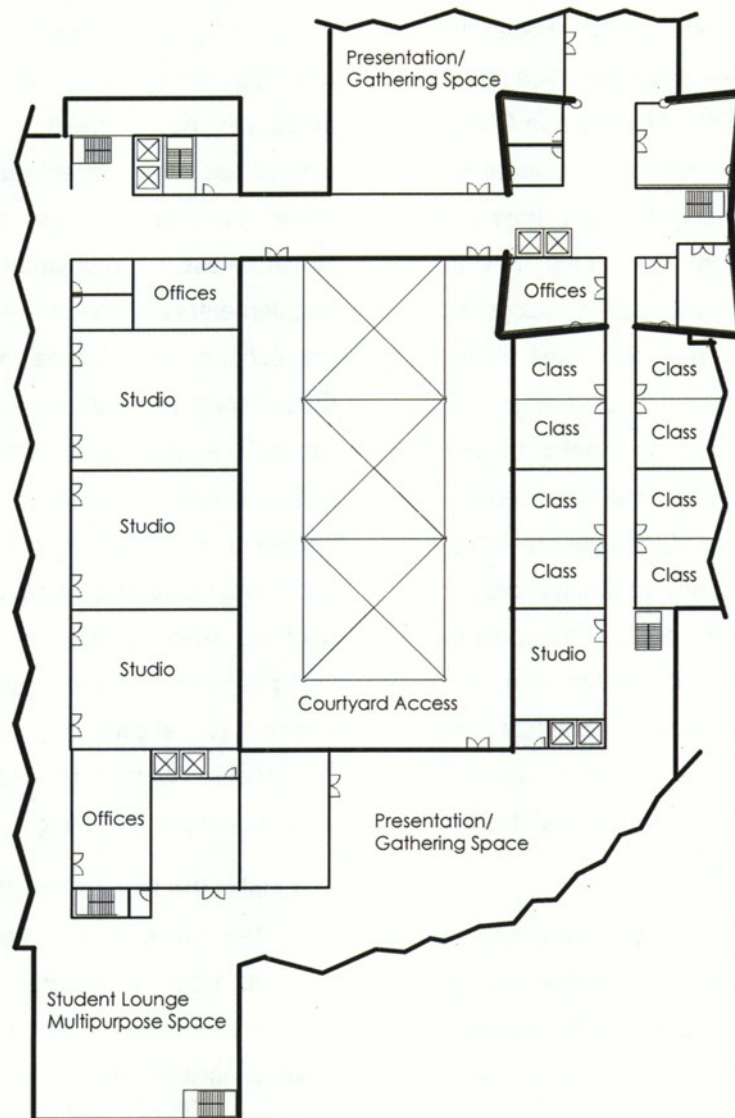


Figure 17: Level 2 Plan



In a multicultural, educational community, it can become clear that one's own frame of reference is "only one out of many worlds of consciousness that exist, and that those other worlds must contain experiences which have a meaning for our life also" (Markus and Conner 2015, 36). There will not be one idealized standard as to what language, art, meals, or architecture are limited to. Values may be shared between groups, but a successful solution or project in the eyes of one student may look completely unique to another. This may explain how those who have traveled internationally have been able to understand outside cultures and are able to generate more creative solutions. According to psychologists Angela Leung and Chi-ye Chiu, international individuals are more imaginative and "less intimidated by the practices, artifacts, and concepts that are different from or even in conflict with those in their own culture" (Markus and Conner 2015, 215).

To foster interactions between groups, architectural spaces in *Tessellate*'s learning community address a variety of class or group sizes. An example of a linguistic classroom is shown in *Figure 17*. Studio and classrooms are provided with partition walls to accommodate small to intermediate size groups. Two large double-level multipurpose rooms can accommodate very large classes or serve as event spaces in which to stage guest speakers. Additionally, common areas in the learning center include hallways and student lounges.

In educational settings, many students or faculty members seem to cross paths with one another in circulation areas. Sometimes, these unexpected meetings lead to small talk. Sometimes they allow old friends to introduce new friends to each other. Sometimes they even lead to exchanging more important ideas or future plans. Nevertheless, circulation areas need supplementary space to foster these interactions without causing an obstruction to those trying to move on to their destination. Around studio and presentation areas, hallways are designed with niches to allow people to meet, move out of the circulation path, and have quick conversations with one another. Also, visible in hallways, student lounges provide space for extended meetings. *Figure 17* shows the second level of *Tessellate*, which is the first level of educational programming.

Finally, the looped circulation of *Tessellate* facilitates collaboration between people of different academic programs. Individuals can be more aware of the activities of other programs when they pass by their physical spaces every day. Overall, the architectural spaces of *Tessellate*'s learning community promote an exchange of multicultural and multidisciplinary information through an accessibility of space, adaptable to a variety of student group sizes.





## Explore

### A Story from the Ground Plaza

*Throughout Vancouver's transportation network, thousands of individuals create a constantly kinetic presence as they travel between points. Hundreds of tourists eagerly explore the Gastown district, the Olympic BC place arena, and the Queen Elizabeth Theatre. At the nearby Living-Learning Community, students and faculty seek out local destinations for quick meals and school supplies.*

*One autumn afternoon, a family from Hong Kong emerge from a metro station on their way to visit their friends in nearby Chinatown. Elijah, the youngest sibling in the family, first hears the gentle strum of the ehru in the distance; his ears are attuned to the string instrument from his extensive daily lessons.*

*As the two children and their parents walk outside, they immediately see the tower of Tessellate. Their eyes follow its structure along the street, and they notice a crowd of people moving in the music's direction. In their curiosity, and through Elijah's encouragement, the family seeks out the ehru's source.*

*They soon turn a corner, and a plaza, bursting in activity, enters their view. The family discovers that Tessellate is currently hosting their annual Multicultural Arts Fair, open to the public. A group of five Chinese student musicians have reserved the central event pavilion for the next half hour.*

*As they absorb their surroundings, the Hong Kong family notices several small kiosks showcasing an array of student artwork. They also glance at a line of food trucks in the plaza's corner. Laura, the elder sibling, admits she is hungry, and the family continues toward the food trucks. They are amazed by the variety of choices. One food truck offers American comfort food with a Thai fusion. Another offers Mediterranean-style pita wraps. After scoping out their options, the family selects from a food truck menu offering a dozen types of grilled cheese.*

*By now the music has ended, and another student group prepares their performance. The parents soon decide they should find their friend's apartment, perhaps coming back in the evening for more festivities. Turning around, though, the family notices that the living-learning community's doors are open, and Elijah and Laura insist that they peek through its exhibitions as they meander to their friend's apartment. The family enters the atrium, illuminated in natural light from skylights above. They see many groups of students and visitors; they hear pieces of conversations in a half dozen different languages, all collecting into a pervasive hum within the large space.*





Figure 18: Linguistic Classroom

*The two children and their parents peer through the crowd's silhouettes and glimpse artwork on their left. As the family approaches the work, they transition into a quieter, more compressed space. In the gallery, abstracted human forms poise in frozen motion. Life-size collages cast barrages of color into the family's view. In admiration, the family wanders through the gallery, and arrives back into the atrium. From there, the family realizes their friends are waiting for them, and they continue to their destination.*

Through *Tessellate's* ground level design, visitors are encouraged to engage in the community personally. Two main entrances open the building's ground level for the public interaction. Upon entering, visitors move into a spacious central atrium, illuminated by skylights approximately 12 m above. As they peer around this interior space, illustrated in *Figure 18*, visitors can glimpse a variety of smaller spaces at the atrium's perimeter: a multilingual bookstore that offers top-selling books in a variety of languages, an art gallery that exhibits student work, a culinary workshop/exhibition area, and several other small cafes.



Individuals can choose to pass through the building quickly or wander around. Student groups can grab a book or meal in a perimeter space, and then return to the central atrium, taking a seat under the skylights. During lunch hours or other busy times, the ground floor accommodates dozens of conversations, typically in nearly half a dozen different languages.

Outside the central atrium, an open plaza, covered seating, and park area serve as a center for the school's connectivity with the community. A corner pull-in driveway serves as an outlet for food truck vendors and artisans. Also outdoors, visitors, students, and faculty can gather at a seating area with a central fountain feature. If people prefer shelter from the sun or rain, a covered area provides additional seating. This protective structure also helps enclose the project's plaza, defining the project's east perimeter with the same folding geometric system as the covered rooftop of the living community above.

The architectural organizing principle utilized at the ground level incorporates primary spaces with boundary groupings. One interior atrium and one exterior courtyard serve as the two central spaces by which perimeter spaces are clustered. These perimeter spaces provide a differentiated range of programmatic elements, including stores, seating areas, and various food options. The perimeter spaces also define the boundaries of the larger space with which they are grouped.

In effect, the ground level can be conceptually represented as a figure-8 in plan, with controlled circulation points between spaces. *Figure 19* helps represent this concept. To distinguish transitions between exterior and interior spaces, the perforated metal skin system that wraps *Tessellate's* educational levels breaks apart from its regular patterning.

According to Mehaffy and Salingaros, the ability to perceive clear and proportional ordering systems in architecture, including primary-secondary groupings with clear transitional spaces, can help promote "emotional comfort and physiological well-being" (Mehaffy and Salingaros 2015, 53). When individuals can understand clear relationships between spaces, they may find that environmental cues (privacy, authority, sociability, etc) are easier to recognize and navigation between spaces is effective.

*Tessellate's* ground level, encourages visitors and residents to explore the art of different cultural groups. Through displaying programs on the ground level that include cultural artifacts, such as food, art, and music, individuals are immersed into the crafts and experiences of other cultures. The potential uses for the project's ground level is limited only by weather, time of year, and the unique individuals that use these spaces. An efficient organizational system of two central spaces, one exterior, and one interior, enables the crafts of different cultures to be celebrated, with few interruptions.



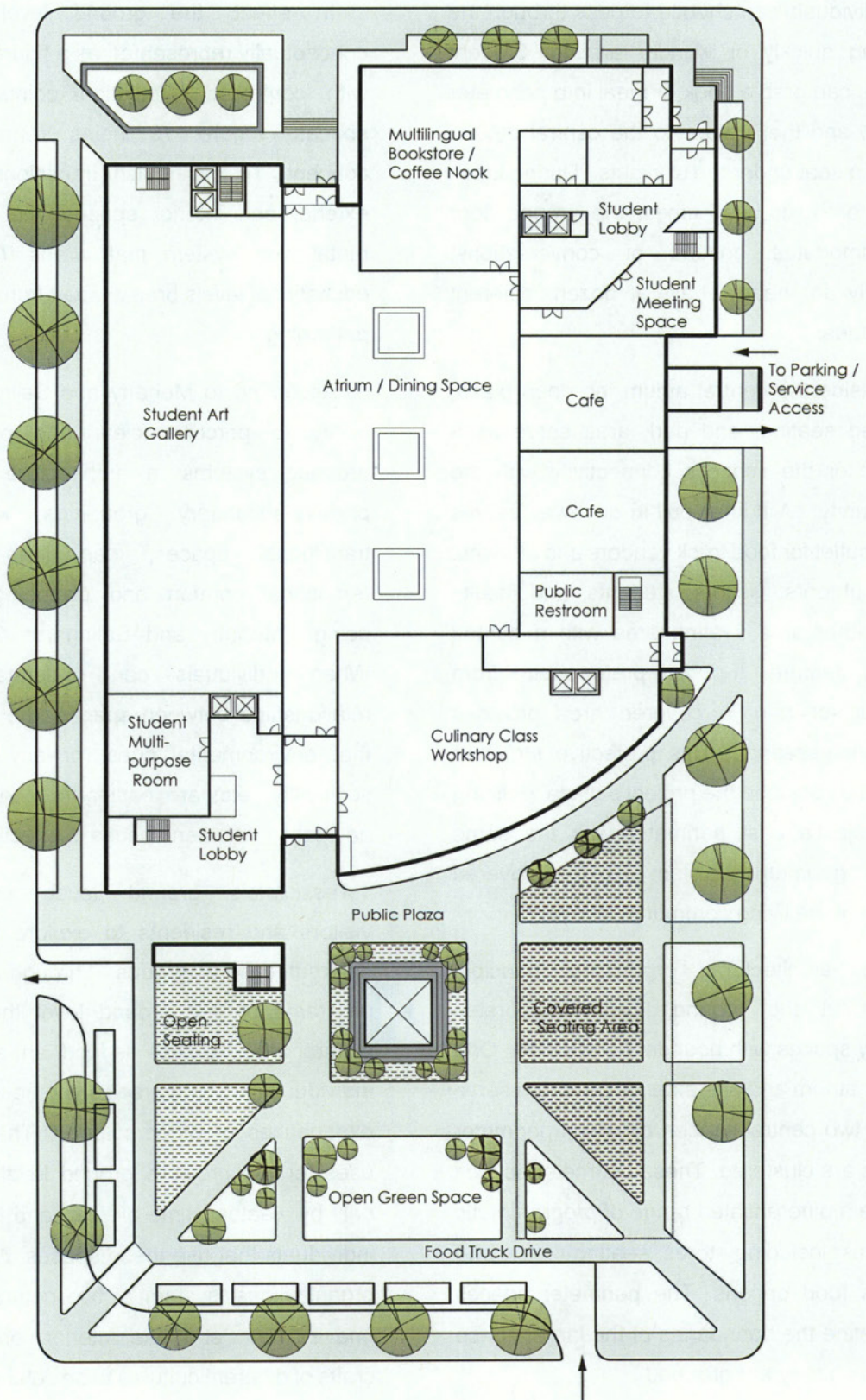


Figure 19: Ground Level Floor Plan



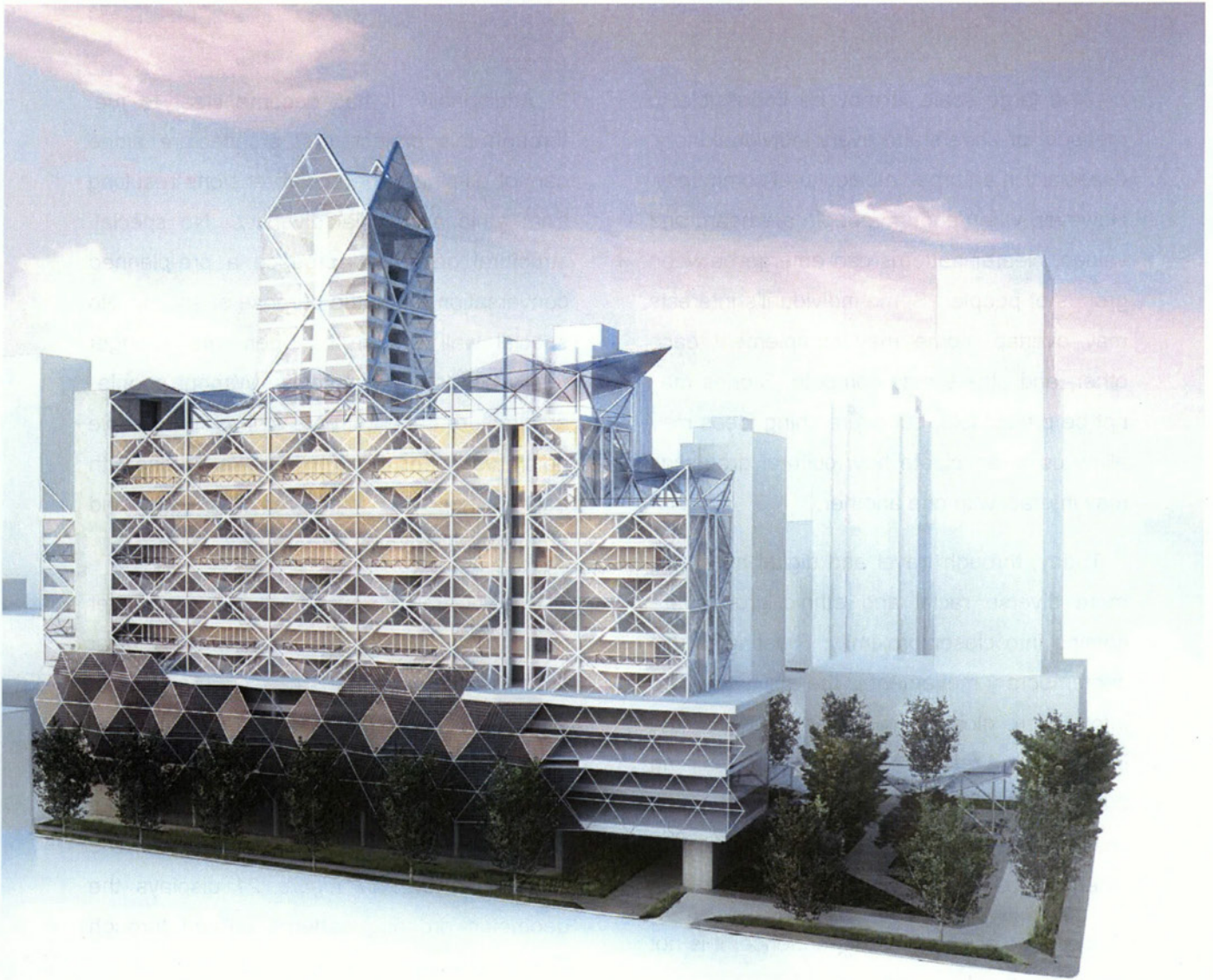


Figure 20: View from Market

## Conclusion

By considering the sheer multitude and diversity of individuals that would use a mixed-use, urban building such as *Tessellate*, it soon became clear that each interaction between people and their constructed environment would be impossible to predict. Individuals would enter the community with thousands of personal stories. In turn, individuals would share their tales and create narratives with each other.

However, saying that each individual story, conversation, meal, song, or spatial experience does not matter in the big picture would be forgetting the forces that shape our identities. Our daily interactions, including our relationships, living arrangements, food, and entertainment, constantly form and reinforce the cultural systems that define us as products of the architecture of our experiences.



At a large scale, it may be impossible to measure or understand every individual story, especially in an urban multicultural community. However, when enough people are heard and valued, clearer patterns can emerge between groups of people. Some individual's interests may overlap, some may complement each other, and others may compete. Stories may not be predictable, but overarching ideas may allow us to anticipate how cultural groupings may interact with one another.

Today, through travel and digital networks, more diverse racial and ethnic groups are coming into closer proximity. Relating to this contemporary movement is the ability to share information globally in an instant via the internet. As a result, more people are realizing that a region's social and environmental challenges have causes and effects that extend across the planet.

Because of such interdependence, it is not enough to simply accept that certain people are different and categorize them within cultural silos. When an individual can listen to and put one's self in another's perspective, it is possible to see similarities. We can recognize where our values clash or complement each other. At the least, an individual may realize a neighbor is a human being with similar aspirations, needs, and previous experiences – much more than a cultural stereotype. At the very best, as groups collide, those aware of their own cultural forces can learn from others and make better-informed decisions in the interest of everyone.

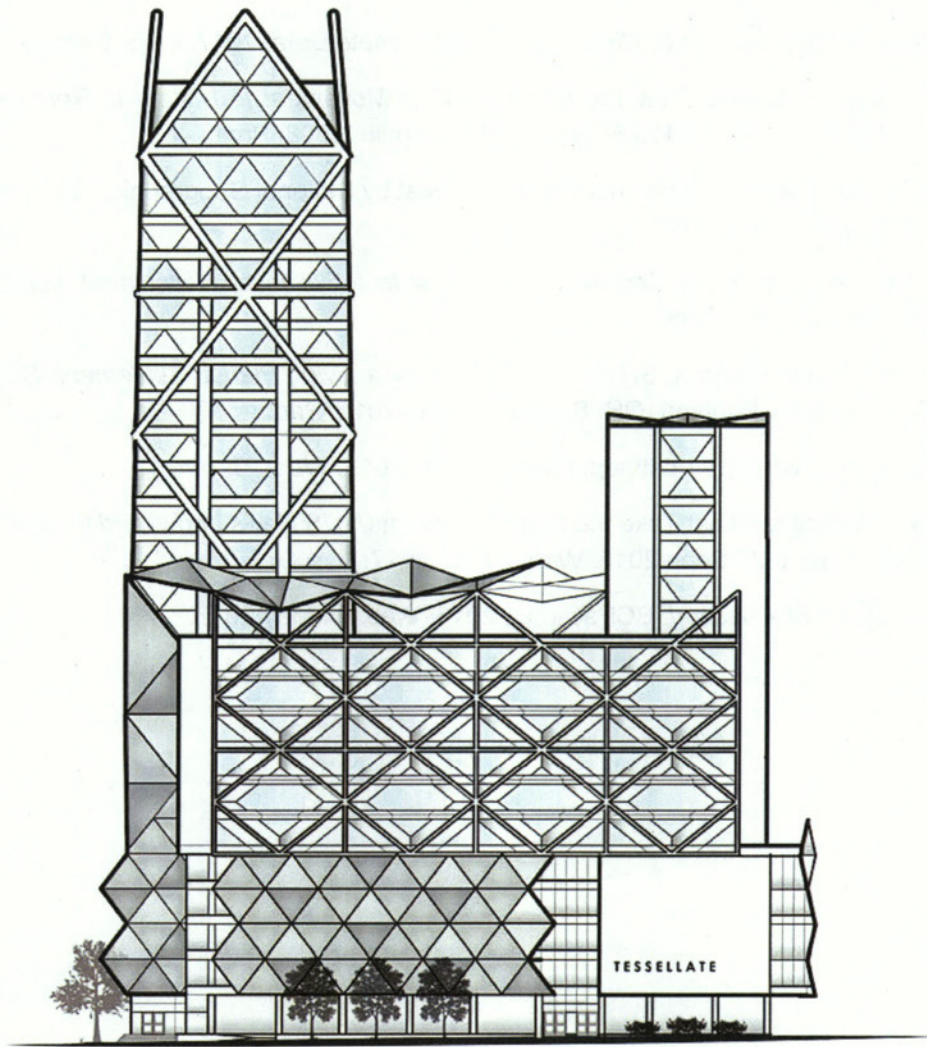
Additionally, it has become clear to me, through this project, that architecture alone cannot eliminate the social tensions resulting from ethnic and racial diversity. No special structural detail can produce a pre-planned conversation about the purpose of society. No special wall system can generate stronger family bonds or friendships. Without people, architecture cannot create stories, but people do create stories through their interactions with each other and their environment, and architecture can shape that.

Keeping this in mind, design can foster healthful livelihoods. Through clear organizational systems such as hierarchies of scale, efficient circulation, boundary groupings, and clear transitions, people may become more attuned to how their environment is saturated with culturally rich information. The elevation shown in *Figure 21* displays the geometric ordering patterns utilized through *Tessellate's* design.

More specifically, In *Tessellate*, a focus is placed on the conversations students may have with others. This, again, can be evidenced in the *Live* program through levels dedicated solely to social activity; in the *Learn* program through hallway niches and social lounges; and finally, through the *Explore* program through centralized spaces with perimeter groupings.

Finally, planning a program incorporating some of the most culturally-sensitive artifacts, including art, language, food, and architecture,





*Figure 21: Tessellate Elevation*

serves as a catalyst for conversations around race, ethnicity, and the context in which an individual grows up. When individuals can ask one another questions regarding cultural perspectives, groups may be able to appreciate and learn from one another's

stories. By fostering interactions between people and their constructed environment, *Tessellate* integrates a culturally-rich, interdependent community in downtown Vancouver.



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